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Inventor: Sines
Serial No. 09/364,256

PATENT APPLICATION
Navy Case No. 79,955

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: E. Sines

Serial No. 09/364,256

Filed: July 30, 1999

Examiner: G. Perez

Group Art Unit: 2834

For: ELECTRICAL POWER
COOLING TECHNIQUE

#11/Ext.^①/E
Hawkins
12/4/01

AMENDMENT UNDER 37 C.F.R. SECTION 1.111

Associate Commissioner for Patents
Washington, DC 20231

Sir:

Examiner Perez and Supervisory Primary Examiner Ramirez are thanked for the interview they conducted with the applicant's attorneys on July 23, 2001. This amendment and remarks are made in response to this interview and in response to the Examiner's Office Action of April 20, 2001. It is respectfully requested that the following amendment be entered into the record.

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IN THE CLAIMS:

✓ Claims 13-17 are cancelled and are rewritten as claims 18-22 as follows:

E' 18. An electric motor comprising:
one or more laminations of a metallic material forming an outer casing of the electric motor;
one or more circular non-metallic, flat, thermally conductive disks positioned between said laminations for conducting heat generated by an electrical current flowing within the motor through said conductive disks;
an electrically conductive material wound in a plurality of layers within the laminations so as to form an electric field that drives an armature when an electrical current is applied;
thermally conductive strips placed between preselected layers of the electrically conductive material, said thermally conductive strip extending outside of the area covered by the electrically conductive material; and
means for conducting heat at the end of each of the non-metallic thermally conductive disks and the thermally conductive strips thereby cooling the motor.

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19. A method for cooling electrical devices having layers of electrically conductive material wound on a core comprising the steps of:

placing a non-metallic thermally conductive strip having a first end and a second end, capable of conducting heat from between layers of the electrically conductive material, with said strip extending through at least some of the layers of electrically conductive material wound on the core with both said first end and said second end extending outside of an area covered by the layers of electrically conductive material; and

conducting the heat from the layers of electrically conductive material through the first and second ends of the non-metallic thermally conductive material thereby cooling said electrical device.

20. A method as in Claim 19, further comprising the step of:

placing the non-metallic thermally conductive strip having a first and second end between a plurality of predetermined laminations of the core, said first and second ends of the non-metallic thermally conductive strip extending outside the core.

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cancel.*

21. A method for cooling an electrical device having layers of electrically conductive material wound on to a laminated core having a heat generating component comprising the steps of:

placing one or more non-metallic, flat, thermally conductive strips in contact with the heat generating component across its entire length, each of said thermally conductive strips extending outside of the area covered by the electrically conductive material and core and in physical contact with the electrically conductive material, thereby receiving heat from the electrically conductive material, and

removing heat from the thermally conductive strips.

22. An electric motor, as in Claim 18, further comprising one or more thermocoolers adjacent to and touching the outer casing of the motor to conduct heat from the non-metallic thermally conductive strips and the metallic laminations forming the outer casing of the motor.

RESPONSE

Claims 18-22 remain in the application.

The pending claims are not under final rejection and are substantially rewritten from the now cancelled claims 13-17.

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REJECTION OF CLAIMS 14 and 16 UNDER 35 USC § 103(b)

The Examiner has rejected Claims 14 and 16 as being unpatentable based on Kanai in view of Davis. The examiner asserts that Kanai teaches a method for cooling electrical devices but does not teach the claimed feature of cooling by thermally conductive strips made from a non-metallic material.

The Examiner relies on the teaching of Davis to show the non-metallic conductive strips. However, close review of Davis at column 6 lines 34-38 reveals that the reference merely suggests the use of thermally conductive elements in air gaps and does not present the necessary detail to implement the use of strips or their physical configuration in heat removal as detailed by the applicant's claims. Additionally, there is no motivation or suggestion in the cited references for combining the reference of Kanai with the reference of Davis.

In view of the lack of motivation for combining the references and the teaching of Davis which does not detail the claimed invention as set forth by the applicant, the applicant therefore submits that the newly redrafted claims are allowable and requests that the rejection on these grounds now be withdrawn.

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REJECTION OF CLAIM 15 UNDER 35 USC § 103(a)

The Examiner has rejected Claim 15 under 35 USC § 103(a) as being unpatentable over *Kanai* in view of *Davis* and further in view of *Herron*.

The Examiner admits that neither *Kanai* nor *Davis* discloses the steps of placing a thermally conductive strip having a first and second end between predetermined laminations of the core. The examiner then argues that *Herron* discloses placing a thermally conductive strip (12) between predetermined laminations of the core (11).

However, upon review of the cited reference *Herron*, this prior art does not teach the use of the nonmagnetic lamina for any use in cooling the motor, but rather to provide 'voids' for cooling (See col. 3 lines 40 et seq.) In fact these lamina provide a different function entirely, i.e. that of providing recesses into which magnets are deposited. Thus there is no suggestion to employ the nonmagnetic lamina structure to provide cooling for electric motors.

In view of the teaching of *Herron* to nonmagnetic lamina for a different purpose and the teachings of *Kanai* or *Davis* to use air gaps for cooling, the applicant submits that the *Herron* reference does not apply to the limitations of the instant claims and that the other references both alone or in combination do not

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render the applicant's claim unpatentable.

REJECTION OF CLAIMS 13 AND 17 UNDER 35 USC § 103(a)

The Examiner has rejected Claims 13 and 17 under 35 USC § 103(a) as being unpatentable over Herron in view of G. A. Washburn (US Patent No. 422,863, published March 4, 1890) and further in view of Kanai and further in view of Jarczyński.

The arguments made above regarding Herron and Kanai are also applicable to this basis of rejection and are reiterated here in rebutting this grounds of rejection.

The Examiner again admits that Herron does not disclose the following elements: nonmetallic disks placed between motor laminations, electrically conductive material wound in a plurality of layers within the laminations, the thermally conductive strip extending outside the area covered by the electrically conductive material, and the means for conducting heat at the end of the conductive disk and strips.

For all of these claimed elements which are missing from the base teaching of the prior art, the Examiner relies on the three way combination of references: Washburn, Kanai, and Jarczyński. The Examiner submits that Washburn teaches the non-metallic flat disks (Figure 6 lines 14-20) for the purpose of improving cooling performance. However, a closer review of Washburn reveals on col. 2 lines 85 et seq. stating that

Keeping in mind the prime purpose of a cool armature, it is desirable to have as little contact as practicable between

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the opposed plates, and this separation, so far as contact is concerned, is accomplished by employing as few of the beads as will serve the purpose, thus leaving substantially the whole of both sides of each plate exposed to the air.

Thus the intent of Washburn is air cooling, not cooling with a non-metallic thermally conductive material as claimed by the applicant. The applicant submits that Washburn teaches away from the disclosure and claims of the instant invention and therefore provides no motivation to combine its teachings with those of Herron.

While the Kanai and Jarczyński references teach cooling, unlike the applicant they teach the use of metallic conductive materials for this purpose.

The applicant's claims are therefore allowable over the cited references, and the applicant respectfully requests that the rejection on this basis now be withdrawn.

CONCLUSION

In view of the foregoing amendments and redraft of the claims at issue in this case as well as the arguments made in the remarks above, it is respectfully submitted that the claims in this case, Claims 18-22, are in a condition for allowance. The examiner is respectfully requested to review this fax transmission from the applicant as soon as possible in order to make an early determination on the status of this case.

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~~Respectfully submitted,~~

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Prepared by:

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202-404-1553
August 16, 2001